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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/595,660

05/03/2006

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EXAMINER

ROE, JESSEE RANDALL

ART UNIT

PAPER NUMBER

1733

NOTIFICATION DATE

DELIVERY MODE

11/14/2011

ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

docketing@howsonandhowson.com

Office Action Summary	Application No. 10/595,660	Applicant(s) SHINDO, YUICHIRO	
	Examiner JESSEE ROE	Art Unit 1733	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 27 October 2011.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 5) ☒ Claim(s) 1,2,9-11,14,15,18 and 19 is/are pending in the application.
- 5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1,2,9-11,14,15,18 and 19 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 12) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. ____. |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>27 October 2011</u> . | 6) <input type="checkbox"/> Other: ____. |

DETAILED ACTION

Status of the Claims

Claims 1-2, 9-11, 14-15 and 18-19 are pending and currently under examination and claims 3-8, 12-13 and 16-17 are canceled.

Status of Previous Rejections

The previous rejection of claims 2 and 9-10 under 35 U.S.C. 103(a) as being unpatentable over the ASM Handbook Volume 2 is withdrawn.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-2, 9-11, 14-15 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shindo (US 2003/0062261).

In regards to claims 1-2 and 11, Shindo ('261) discloses a high purity hafnium metal with minimal impurities that would be used for sputtering targets to form thin films (title, abstract, [0018] and [0022]). Shindo ('261) discloses (Example 2) forming a 4N (99.99%) purity level hafnium metal excluding gas components such as carbon, oxygen, and nitrogen [0133]. Oxygen and carbon would be present at levels less than 500 ppm

and forming a sputtering target or thin film and zirconium would be present at levels of 0.5 weight percent or less ([0064] and claim 7).

The Examiner notes that the composition disclosed by Shindo ('261) overlaps the composition of the instant invention, which is *prima facie* evidence of obviousness. MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the claimed amount of gas components such as oxygen, carbon, and nitrogen from the amounts disclosed by Shindo ('261) because Shindo ('261) discloses the same utility throughout the disclosed ranges.

With respect to the recitation "a sulfur content of 10wtppm or less, a phosphorus content of 10wtppm or less, and a zirconium content of 0.1wt% or less" as in claims 1-2, the Examiner notes that purer forms of known products may be patentable, but the mere purity of a product alone does not render the product unobvious. MPEP 2144.04 (VII).

With respect to the transitional phrase "consisting of" in claim 2, the Examiner notes that the products disclosed by Shindo ('261) does not require elements in addition to hafnium. Therefore, Shindo ('261) meets the claim.

With respect to the recitation "wherein said oxygen content is 10wtppm or less" of claims 9, 14 and 18, Shindo ('261) discloses that oxygen would be reduced to 500 ppm or less [0064].

With respect to the recitation "wherein said sputtering target has a body produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot, subjecting the ingot to deoxidation with molten salt, and forming a

sputtering target from the ingot after said deoxidation” of claim 10, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

With respect to the recitation “wherein said thin film is a sputtered thin film produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot, subjecting the ingot to deoxidation with molten salt, forming a sputtering target from the ingot after said deoxidation, and depositing said thin film on the substrate by performing sputtering with the sputtering target” of claim 15, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

With respect to the recitation “wherein said high purity hafnium is produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot and subjecting the ingot to deoxidation with molten salt” as in claim 19, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-

process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

Claims 1 and 18-19 are rejected under 35 U.S.C. 103(a) as being unpatentable over the ASM Handbook Volume 2.

In regards to claim 1, the ASM Handbook Volume 2 discloses (pg. 1094, cols. 2-3) purifying metals such as hafnium to a purity approaching 99.999% by chemical vapor deposition when a low-iron starting material would be used. The ASM Handbook further discloses that if the proper temperature is maintained, oxygen, nitrogen, hydrogen, carbon, and other typical metal impurities would not be carried over.

The Examiner notes that the purity of the hafnium disclosed by the ASM Handbook Volume 2 overlaps the purity of the instant invention, which is *prima facie* evidence of obviousness. MPEP 2144.05 I. It would have been obvious to one of ordinary skill in the art at the time the invention was made to have selected the claimed hafnium purity from the hafnium purity disclosed by the ASM Handbook Volume 2 because the ASM Handbook Volume 2 discloses the same utility throughout the disclosed range.

With respect to the recitation "wherein said oxygen content is 10wtppm or less" of claim 18, the ASM Handbook Volume 2 discloses (pg. 1094, col. 2) discloses

that oxygen would not be carried over.

With respect to the recitation "wherein said high purity hafnium is produced by subjecting a hafnium raw material to electron beam melting to form a hafnium ingot and subjecting the ingot to deoxidation with molten salt" as in claim 19, the Examiner notes that the claims are drawn to a product and not a process. Even though product-by-process claims are limited by and defined by the process, determination of patentability is based on the product itself. The patentability of a product does not depend on its method of production. If the product in the product-by-process claim is the same as or obvious from a product of the prior art, the claim is unpatentable even though the prior product was made by a different process.

Response to Arguments

Applicant's arguments filed 27 October 2011 have been fully considered but they are not persuasive.

First, the Applicant primarily argues that with respect to Shindo ('261), it is known that large amounts of zirconium and oxygen will always be contained in a non-purified hafnium material and it is also known that the physical-chemical property of zirconium is similar to hafnium and that it is difficult to separate and remove zirconium and oxygen from hafnium. The Applicant further argues that it is an error to conclude that "one skilled in the art would be informed that the lower limit of these ranges (content of Zr and O within Hf composition) would be 0" and one of ordinary skill in the art would

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certainly not expect zirconium and oxygen within a hafnium composition to be reducible to "0".

In response, the Examiner notes that in terms of the zirconium content in the hafnium being 0.5% or less and the oxygen content being 500 ppm or less, one skilled in the art would be informed that the lower limit of these ranges would be 0 ([0031], [0064] and claim 7). To establish unexpected results over a claimed range, applicants should compare a sufficient number of tests both inside and outside the claimed range to show the criticality of the claimed range. MPEP 716.02(d)(II).

Second, the Applicant primarily argues that the concentrations of zirconium and oxygen as impurities are reduced in the present invention for purpose of stabilizing the characteristics of a hafnium composition and yields a result of making the composition useful in electronic products. The Applicant further argues that a hafnium composition capable of providing such a result is not taught nor expected from the disclosure of Shindo ('261).

In response, the Examiner notes that Shindo ('261) teaches that impurities in hafnium hinder the operational performance of semiconductors which have utility in electronic components [0021]. Therefore, it would have been obvious to one skilled in the art to minimize the impurities in order to optimize the operational performance of hafnium. MPEP 2144.05 II. Applicant has failed to demonstrate the criticality the criticality of the claimed ranges of impurities over the disclosed ranges with regard to operational performance in electronic products. MPEP 716.02(d)(II).

Third, the Applicant primarily argues that the “residual resistance ratio” of a material is generally used as a reference for quantitatively representing the impurity content and processing strain concentration existing in a high purity metal. The Applicant further argues that the residual resistance ratio is not a value that depends only on the type and/or concentration of trace amounts of impurity elements remaining in a high purity metal; the greater the residual ratio means that there are Fewer crystal defects; and even if the purity is of a given level, this does not mean that the same level of residual resistance ratio will be obtained for a material.

In response, the Examiner notes that the claims no longer recite a “residual resistance ratio” and therefore the Examiner has considered Applicant’s arguments regarding the “residual resistance ratio” moot in view this subject matter no longer being present in the claims.

Fourth, the Applicant primarily argues that the ASM Handbook clearly fails to disclose a purity level of hafnium that can be achieved and the only evidence provided is by “Ref. 5” cited in the ASM Handbook discussed in Applicant’s previous responses and the purity disclosed in Ref. 5 is significantly less than that required by the claims of the present application. The Applicant further argues that from an inspection of “Ref. 5”, the purity of the hafnium subject to the iodine process is 98.92 to 99.22 and the oxygen content is 140 to 500 ppm and these values are significantly different from that required by the claims of the present application and clearly do not “overlap” the requirements of the claims of the present application.

In response, the Examiner notes that according to the ASM Handbook Volume 2, to achieve the purity level of 99.999%, the starting metal must have a purity of about 99.9% and be a low-iron starting metal (pg. 1094, col. 3). Since none of the hafnium final products disclosed in Rolsten (Iodide Metals and Metal Iodides) have a purity greater than 99.22%, it is clear that the starting metal did not have a purity of 99.9% (since 99.9% is of higher purity than 99.22%). However, it also quite clear that if one skilled in the art applied to 99.9% purity hafnium metal having low iron then a final product having a purity level of 99.999% hafnium could be achieved by chemical vapor deposition (CVD) according to the ASM Handbook Volume 2 (pp. 1094, cols. 2-3). Therefore, Applicant's arguments are not persuasive.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

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Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jessee Roe whose telephone number is (571)272-5938. The examiner can normally be reached on Monday-Thursday and alternate Fridays 7:00 AM - 4:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V. King can be reached on (571) 272-1244. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jessee Roe/
Primary Examiner, Art Unit 1733